Mechanical engineering interns help assemble the Stress Corrosion Cracking test system, which will show how materials age as part of a reactor life extension study at INL's Center for Advanced Energy Studies.

INL research aims to add longevity to key national energy source

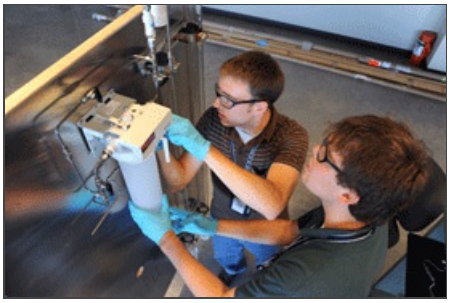
by Kortny Rolston, *INL Communications & Public Affairs*

As demand for electricity continues to grow, U.S. companies are searching for new, reliable sources of energy and making the most of what they already have. A key part of that effort focuses on the source of more than 70 percent of the nation's emission-free electricity.

Scientists at Idaho National Laboratory's Center for Advanced Energy Studies are researching materials that could help extend the life of the nation's 104 nuclear power plants.

They are studying when and how different metallic alloys crack when subjected to the environment found in light water reactors. One of the first projects is being funded by the Electrical Power Research Institute, an industry cooperative that supports power-related research.

"Industry wants to know how these materials react in that environment because they are looking for ways to repair these reactors or extend their lives," said John Jackson, an INL scientist participating in this research at CAES.



INL interns Tanner Hesse (left) and Chris Petrie attach a component to the water purification system on the simulated Boiling Water Reactor (BWR) environment Stress Corrosion Cracking (SCC) test system.

Keeping the current fleet of reactors operational is critical because they supply the country with nearly 20 percent of its power each year.

In addition, most were licensed in the 1970s and are nearing the end of their 40-year operating licenses. At the same time, few new reactors have come online to replace them, which means power companies will have to find other sources of power if they can't keep existing nuclear power plants running.

So far, the only other large-scale option is to burn fossil fuels like coal, a carbon-emitting process that has come under fire for contributing to climate change.

"They don't have a lot of other options," Jackson said.

The CAES research will progress in two phases.

Interns Hesse (left) and Petrie take measurements on the Boiling Water Reactor (BWR)

The current first phase involves stress-testing the metallic alloys in a device at CAES that simulates the high-temperature water in the nation's nuclear reactors. Jackson, INL's Sebastien Teysseyre and others on the team (including researchers from Massachusetts Institute of Technology and other universities and national laboratories) are conducting the tests to monitor when cracks develop and how fast they grow.

Eventually, the team will run those same alloys through INL's Advanced Test Reactor before testing them in conditions similar to those currently simulated at CAES. This second stage of tests will show scientists how the materials hold up in an irradiated environment.

This two-part testing is part of the reason CAES and INL were tapped for the project.

Only a handful of labs in the world are capable of conducting these stress corrosion cracking tests, and no other place has as ready access to a test reactor like ATR.

"We're one of only a few places in the world with this type of capability in one place," Jackson said.

CAES Deputy Director Oren Hester said the project showcases CAES' and ATR's capabilities.

"This project fits nicely into CAES' nuclear science and engineering focus and highlights the partnership being

environment Stress Corrosion Cracking (SCC) test system.

cultivated between CAES and the ATR National Scientific User Facility," he said.

For more information about INL internship opportunities, visit INL's facebook site at http://www.facebook.com/idahonationallaboratory.

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